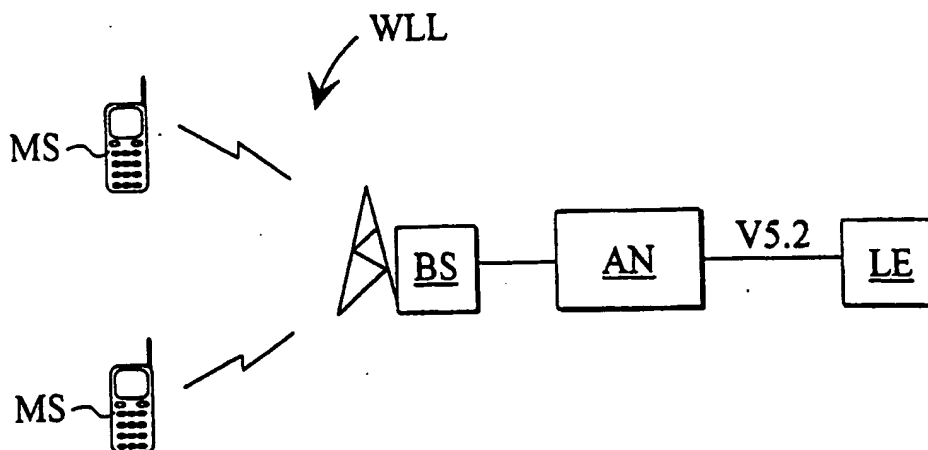




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(21) International Application Number: PCT/FI98/00010 (22) International Filing Date: 2 January 1998 (02.01.98) (30) Priority Data: 970118 10 January 1997 (10.01.97) FI (71) Applicant (for all designated States except US): NOKIA TELECOMMUNICATIONS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): PENTTINEN, Simo [FI/FI]; Radiomastontie 6 A 1, FIN-90230 Oulu (FI). (74) Agent: PAPULA REIN LAHTELA OY; Fredrikinkatu 61 A, P.O. Box 981, FIN-00101 Helsinki (FI).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: PROCEDURE AND SYSTEM FOR ENSURING EMERGENCY CALLS IN A WIRELESS LOCAL LOOP



(57) Abstract

The invention relates to a procedure for ensuring emergency calls in a wireless local loop in which subscriber's stations (MS) are connected over a radio link via a base station (BS) to an access node (AN) and from the access node to a local exchange (LE) of a wired telephone network, in which procedure the authentication process carried out in conjunction with call setup comprises establishing whether the call is to be initiated with a normal call start message or with an emergency call start message that is allowed to cause forced disconnection of another ongoing call having a lower priority in a known manner. A call initiated with a normal call start message is assigned top priority and a definition is made to the effect that forced disconnection of the call is not allowed and that the call is not allowed to cause the disconnection of another call, and the dialling information of the call is compared with a set of predetermined emergency numbers, and if the call is addressed to a number other than a predetermined emergency number, then the priority level of the call is lowered and forced disconnection of the call is allowed.

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PROCEDURE AND SYSTEM FOR ENSURING EMERGENCY CALLS IN A
WIRELESS LOCAL LOOP

The present invention relates to a procedure
for ensuring emergency calls in a wireless local loop,
5 as defined in the preamble of claim 1.

In a wireless local loop (WLL), a terminal de-
vice is connected via a wireless link to an access node
(AN) or a WLL controller. The access node may consist of
multiplexers, crossbar switches and various transmitting
10 systems. The WLL system may be based e.g. on technology
used in mobile telephone systems, such as the
GSM/DCS1800 technology (GSM, Global System for Mobile
Communications; DCS, Digital Cellular System). GSM is a
European digital mobile communication system standardi-
15 zed by ETSI. DCS-1800 is a mobile communication system
standardized by ETSI, which is based on the GSM specifi-
cation and aims at a more effective use of microcells
and which works in the frequency range of 1800 MHz. Bet-
ween the terminal device and the access node there is a
20 base station, through which call signals sent by the
terminal device over a radio channel are transmitted via
the access node to a public telephone network and vice
versa. The access node or WLL controller can be connec-
ted to the telephone exchange using e.g. the V5.2 proto-
25 col consistent with the ETS 300 347-2 standard.

In this context, ensuring an emergency call me-
ans that, in the event of overload on a base station in
a wireless local loop, the setup of a call initiated by
a subscriber's station is ensured while at the same time
30 preventing the setdown of other ongoing emergency calls
from other subscriber's stations under the same base
station when resources have to be released for the setup
of an emergency call by disconnecting other calls.

In a system consistent with mobile communicati-
35 on specifications, such as a GSM system, if an insuffi-
ciency of resources appears, a call started with an

emergency call start message may initiate forced release of a call of a lower priority.

When an access node is transmitting calls in normal load conditions, the system controlling the radio resources of the base station does not know which one of the ongoing calls is a normal call and which one is an emergency call. This is because only emergency calls made from a so-called non-transparent WLL subscriber's station to a common emergency number, e.g. 112, begin with an emergency call start message (e.g. an EMERGENCY_SETUP message consistent with the GSM specifications). Calls made to other emergency numbers specified in the subscriber identification unit, such as the SIM card provided in the subscriber's station, begin with a normal call start message, e.g. a SETUP message consistent with the GSM specifications, if free communication channels are available. In the case of a so-called transparent WLL subscriber's station, even calls made to an emergency number are set up via the normal call setup procedure and begin with a normal call start message because a communication link to the exchange has already been set up when the number is being dialled.

Thus, the problem is that when the base station is overloaded and a subscriber's station in a wireless local loop under it starts an emergency call (which begins with an emergency call start message, such as EMERGENCY_SETUP), forced release of resources for the emergency call in accordance with the GSM specifications is impossible because the other call to be disconnected to make room for the emergency call may also be an emergency call although it has been started with a normal call start message (SETUP). Hand-over of the ongoing call to another base station is also impossible because subscriber mobility is not allowed in the WLL access node.

In the original GSM system, this problem does not appear because an emergency call to a common emer-

gency number always begins with an emergency call start message (EMERGENCY_SETUP message). In cases where the cell concerned has been loaded, there have been two possible ways to cope with the situation: forced handover to another cell or forced disconnection (pre-emption) of an ongoing call, which is possible because the resource management system of the wireless network is always aware of ongoing emergency calls.

Forced disconnection and/or handover is allowed:

- when a call (in this case an emergency call) waiting for a communication channel has the right to cause disconnection of an ongoing call,
- when there is a call for which a vulnerability indicator has been set (vulnerability allowed), and
- when a call waiting for a wireless communication channel has priority level 1.

The object of the invention is to present a procedure that makes it possible to ensure the setup of an emergency call in an overload situation in a wireless local loop while at the same time preventing forced disconnection of other ongoing emergency calls.

A further object of the invention is to present a procedure that allows even an emergency call initiated with a normal call start message to be identified or distinguished from normal calls, so that the wireless network management of the system will know which call is an emergency call and which call is a normal call that can be disconnected to release resources.

The procedure of the invention is characterized by what is presented in claim 1.

In the procedure of the invention,

- a) a call initiated with a normal call start message is assigned top priority and a definition is made that prevents forced disconnection of the call as well as disconnection of another call, and

b) the dialled number information of the call is compared with a set of predetermined emergency numbers, and if the call is addressed to a number not included in the set of predetermined emergency numbers, then the priority level of the call is lowered and forced disconnection of the call is allowed.

Thanks to the invention, the system is always able to decide which one of the ongoing calls is an emergency call and which one is a normal call that can be released in an overload situation.

In an embodiment of the procedure, the priority level reduced at stage b) is updated in the interface defining the signalling between the radio line of a wireless local loop and a wired telephone network, in particular in a so-called Abis interface, and information regarding the new lowered priority is given to the resource management system of the wireless network, thus letting it know which ones of the calls initiated with a normal call start message are subject to forced disconnection when an emergency call is received in an overload situation.

In an embodiment of the procedure, the call start messages are messages consistent with a mobile communication specification.

In an embodiment of the procedure, the call start messages are messages consistent with the GSM specification.

In an embodiment of the procedure, the normal call start message is a SETUP call start message.

In an embodiment of the procedure, the call start message for an emergency call is an EMERGENCY_SETUP call start message.

In an embodiment of the procedure, the highest priority assigned at stage a) is priority level 1 according to the GSM specification.

In an embodiment of the procedure, the lowered priority assigned at stage b) is a priority level other than 1 according to the GSM specification.

5 In an embodiment of the procedure, the comparison at stage b) is carried out in the access node.

In an embodiment of the procedure, the predetermined emergency number is an emergency number stored in a subscriber identification unit, such as a SIM card, in the subscriber's station. The emergency number predefined in a subscriber identification unit, such as a SIM
10 card, is naturally also defined in the parameters of the access node concerned to allow comparison.

In the following, the invention is described by the aid of a few examples of its embodiments by referring to the attached drawing, which presents a diagram
15 of a system in which the procedure of the invention can be applied.

The figure shows a diagram representing a wireless local loop system WLL. in a wireless local loop,
20 in which subscriber's stations MS are connected over a radio link via a base station BS to an access node AN and from the access node to a local exchange LE in a wired network.

In conjunction with the authentication procedure, all calls initiated from the WLL access node with a
25 normal SETUP message are given the following parameters:

top priority 1

call is not subject to forced disconnection
(vulnerability disabled)

30 call is not allowed to cause forced disconnection of another call.

Correspondingly, calls initiated with an emergency call start message EMERGENCY_SETUP are assigned the following parameters:

35 top priority 1

call is not subject to forced disconnection
(vulnerability disabled)

call is allowed to cause forced disconnection of another ongoing call having a lower priority.

The access node AN makes the appropriate connections to the local exchange LE as required for a call
5 started with a SETUP message. When the number dialled by the subscriber is available to the access node AN for interpretation, it is compared with the predefined emergency numbers. If the call is addressed to the common
10 emergency number 112 or some other emergency number specified in the SIM, the priority of the call will not be changed during the call, in other words, its priority level 1 is preserved.

If a call started with a SETUP message is addressed to a number other than the common emergency number 112 or some other emergency number specified in the
15 SIM, then the process comparing the dialling will send data indicating a lowered priority of the call along the signalling chain towards the wireless network. The parameters of the call are set so that

20 the priority of the call is lowered (to a value other than 1)

vulnerability of the call is allowed.

When the message regarding the lowered priority level reaches the signalling process of the Abis interface, which defines the signalling between the transmission
25 path of the wireless local loop and the wired telephone network, said signalling process updates the lowered priority for itself and also informs the wireless network resource management of the cell in question
30 about the new priority level.

Subsequently, when a call initiated with an emergency call start message, i.e. an EMERGENCY_SETUP call start message, is received in a possible overload situation, forced call disconnection can be initiated by
35 the resource management system of the wireless network. The wireless network resource management knows which calls can be disconnected in an emergency. The procedure

enables the wireless network resource management to decide which calls can be released in an overload situation to allow the connection of a possible emergency call.

5 The invention is not restricted to the embodiment example described above, but instead many variations are possible within the framework of the inventive idea defined by the claims.

CLAIMS

1. Procedure for ensuring emergency calls in a wireless local loop, in which subscriber's stations (MS) are connected over a radio link via a base station (BS) to an access node (AN) and from the access node to a local exchange (LE) of a wired telephone network, in which procedure the authentication process carried out in conjunction with call setup comprises establishing whether the call is to be initiated with a normal call start message or with an emergency call start message that is allowed to cause forced disconnection of another ongoing call having a lower priority, characterized in that

a) a call initiated with a normal call start message is assigned top priority and a definition is made to the effect that forced disconnection of the call is not allowed and that the call is not allowed to cause the disconnection of another call, and

b) the dialled number information of the call is compared with a set of predetermined emergency numbers, and if the call is addressed to a number not included in the set of predetermined emergency numbers, then the priority level of the call is lowered and forced disconnection of the call is allowed.

2. Procedure as defined in claim 1, characterized in that the priority level lowered at stage b) is updated in the interface defining the signalling between the radio transmission path of the wireless local loop and the wired telephone network, in particular in a so-called Abis interface, and information regarding the new lowered priority is sent to the resource management system of the wireless network, thus letting the wireless network resource management know which calls initiated with a normal call start message are subject to forced disconnection when an emergency call is received in an overload situation.

3. Procedure as defined in claim 1 or 2, characterized in that the call start messages are messages consistent with a mobile communication specification.

5 4. Procedure as defined in any one of claims 1 - 3, characterized in that the call start messages are messages consistent with the GSM specification.

10 5. Procedure as defined in claim 4, characterized in that the normal call start message is a SETUP call start message.

15 6. Procedure as defined in claim 4 or 5, characterized in that the call start message for an emergency call is an EMERGENCY_SETUP call start message.

7. Procedure as defined in any one of claims 1 - 6, characterized in that the highest priority assigned at stage a) is priority level 1 according to the GSM specification.

20 8. Procedure as defined in any one of claims 1 - 7, characterized in that the lowered priority assigned at stage b) is a priority level other than 1 according to the GSM specification.

25 9. Procedure as defined in any one of claims 1 - 8, characterized in that the comparison at stage b) is carried out in the access node.

30 10. Procedure as defined in any one of claims 1 - 9, characterized in that the predetermined emergency number is an emergency number stored in a subscriber identification unit, such as a SIM card, in the subscriber's station.

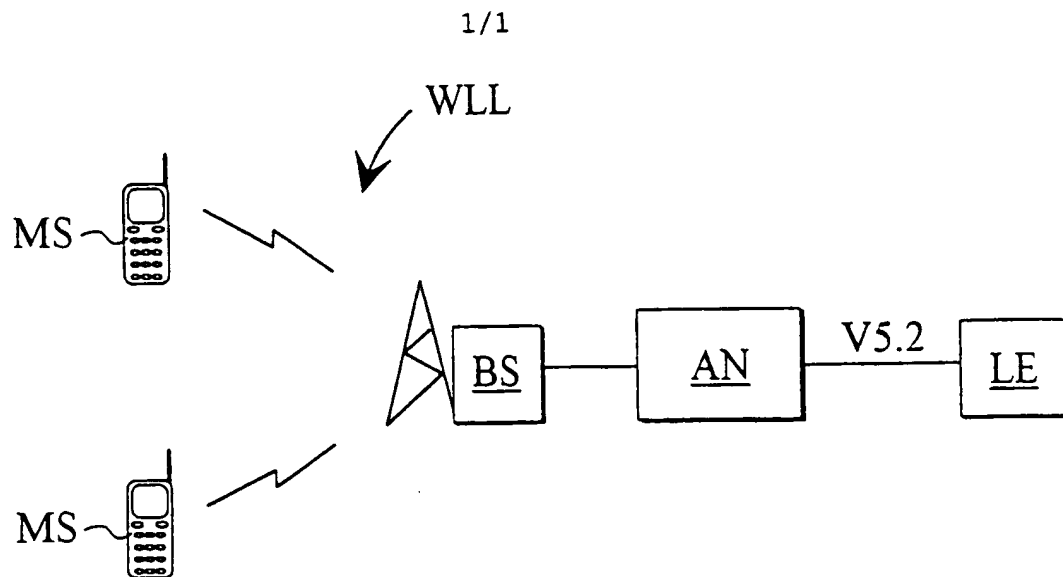


Fig.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 98/00010

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0304955 A2 (NEC CORPORATION), 1 March 1989 (01.03.89), column 1, line 46 - line 51; column 4, line 13 - line 36; column 8, line 15 - line 23, abstract, column 9, line 15 - line 42 --	1-10
P,A	WO 9716931 A1 (MOTOROLA INC.), 9 May 1997 (09.05.97), page 11, line 9 - line 20; page 2, line 8 - line 14, abstract -- -----	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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EP 0304955 A2	01/03/89	AU 594629 B	08/03/90
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